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(71) Applicant(s)  
Industri AB Thule  
(Incorporated in Sweden)  
Box 69, S-330 33 Hillerstorp, Sweden

(72) Inventor(s)  
Clive Bernard

(74) Agent and/or Address for Service  
Hillgate Patent Services  
No 6 Aztec Row, Berners Road, Islington, LONDON,  
N1 0PW, United Kingdom

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(56) Documents Cited  
GB 2325202 A GB 2304087 A GB 2302854 A

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(54) Abstract Title  
**A roof rail connecting arrangement**

(57) A roof rail for a motor vehicle comprises a rail tube 3 and has arranged at an end thereof at least one mounting foot 4a for connecting the tube 3 to the roof. One of the tube 3 and the mounting foot 4a has an end part 6 which is inserted into a corresponding opening 7 in the other. A resilient retainer 9 is arranged to cooperate with the end part 6 and the inside wall of the opening 7. The retainer 9 is supported in a flat recess 8 in the end part 6 and has at least one protruding barb which engages the inside wall of the opening 7. Such a connecting arrangement compensates for manufacturing tolerances and prevents rattling and squeaking noises due to movement of the parts.

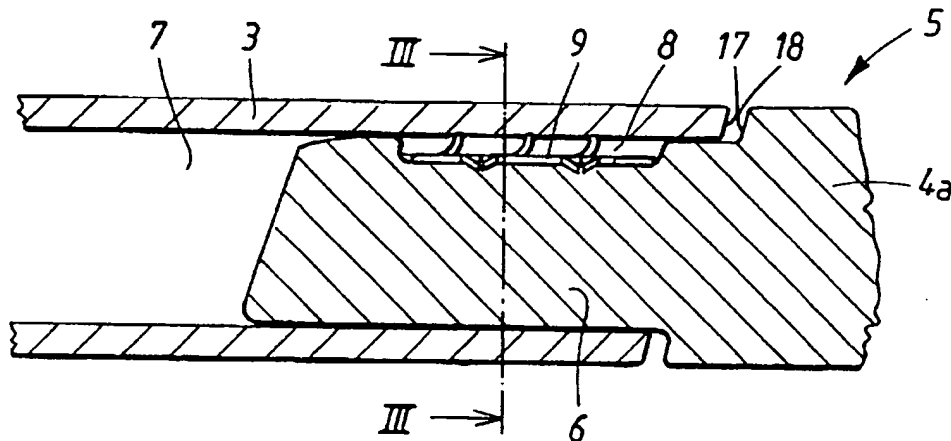


FIG. 2

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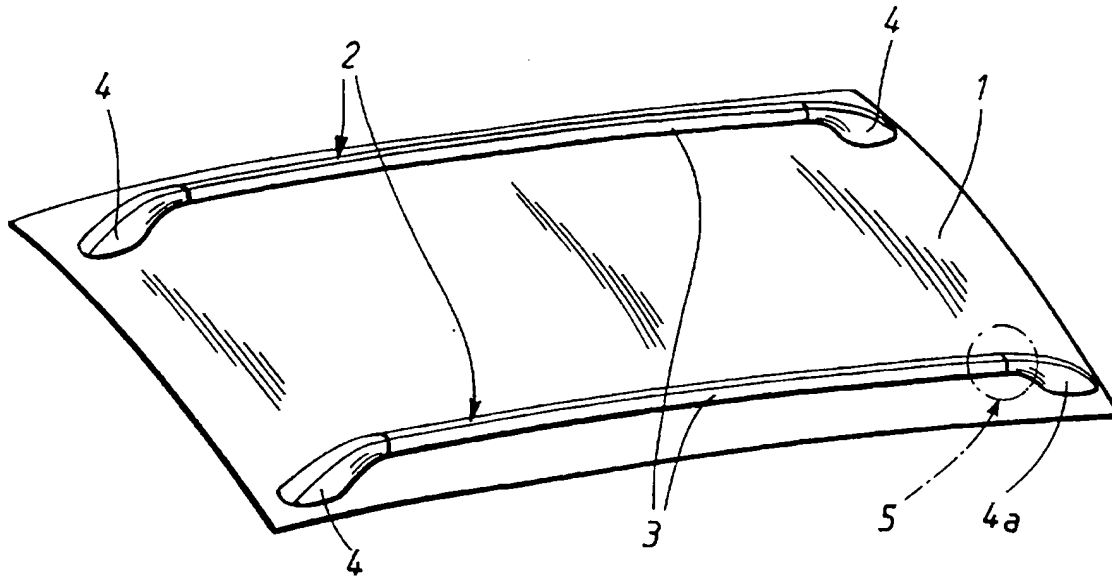


FIG. 1

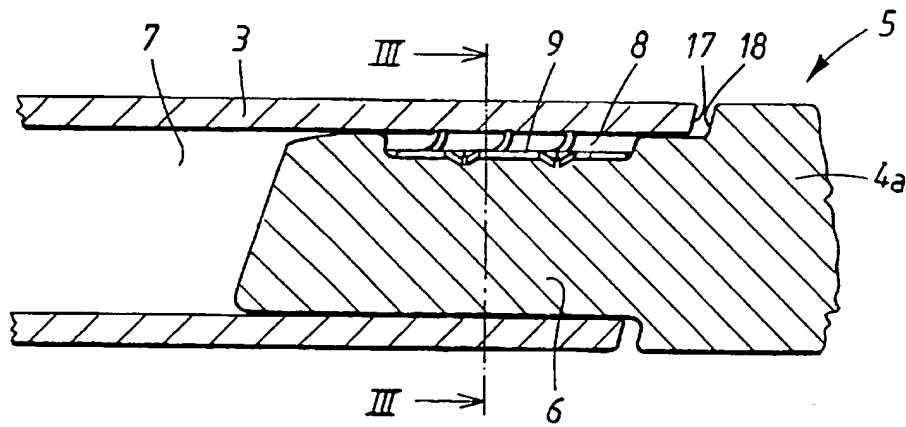


FIG. 2

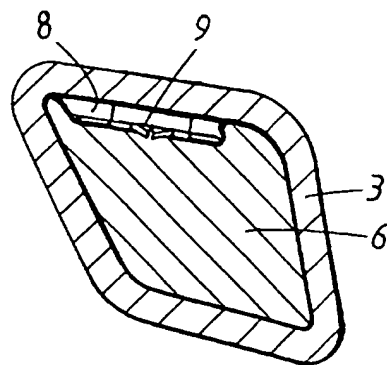


FIG. 3

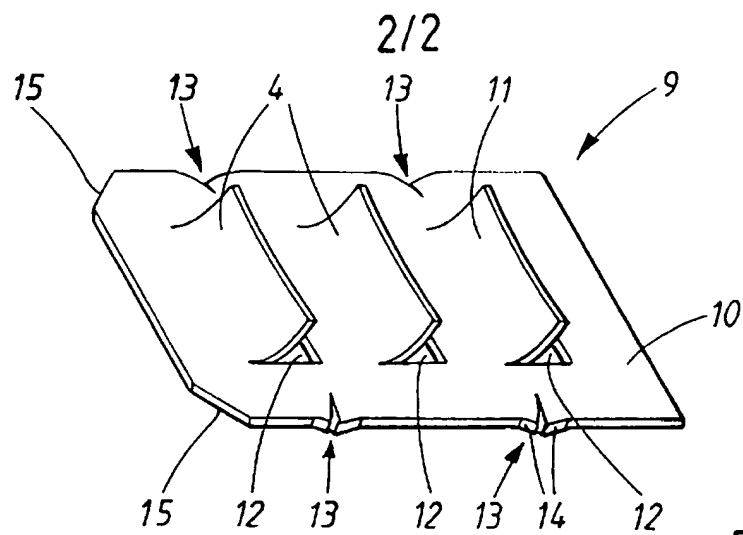


FIG. 4

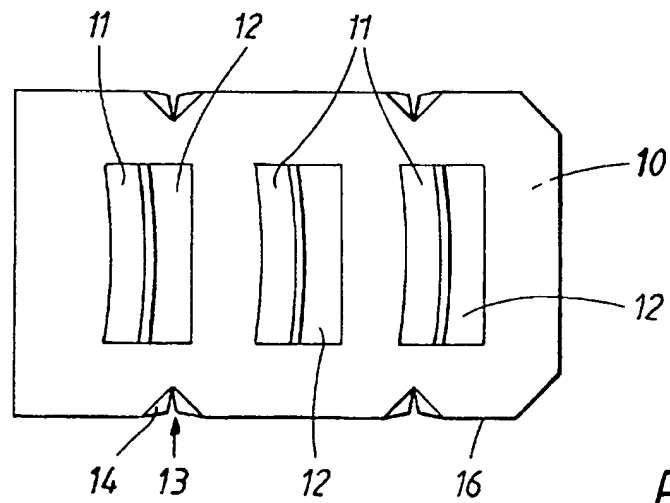


FIG. 5

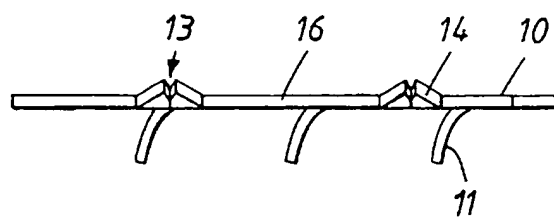


FIG. 6

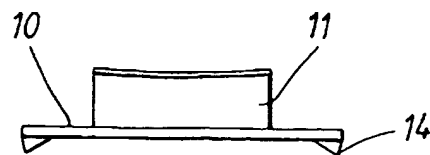


FIG. 7

## TITLE:

A load-bearing roof rail for a motor vehicle roof.

## TECHNICAL FIELD:

- 5 The present invention relates to a roof rail assembly for a motor vehicle roof, the rail being of the type comprising a tube, at least one mounting foot arranged at one end of the tube for connecting the tube to the roof, whereby one of the tube and the mounting foot has an end part for insertion into a corresponding opening in the other, and a retainer arranged to cooperate  
10 with the end part and the inner wall of the opening.

## PRIOR ART:

- In roof rails of the above mentioned kind, it is known to have a recess in the end part and an insert in the recess in the shape of a retainer roll pin, made  
15 of a flexible material. The roll pin is dimensioned and arranged to fit in the recess to be compressed between the end part and the opening inner walls when the rail is assembled.

## 20 TECHNICAL PROBLEM:

- When mounted on a car, the rail mounting feet are fixed to the vehicle roof and as a result, the individual parts are held securely in position. When assembling the rail, however, it is desirable that all the parts are not only easily and securely put together, but once put together, they must be held  
25 together in a way to avoid clearance between the parts that can lead to excessive movement, rattling, "squeaking" sounds or wear. One problem with conventional spring roll pins is that they can easily fall out of the recess during assembly. It can also be difficult to get the inner wall of the opening to ride smoothly "over" the roll pin outer surface. The use of a roll pin retainer is  
30 also limiting in terms of compensating for wide tolerance variations in the size of the end part and the opening. Also the ultimate retaining forces can be

relatively low, as it is only the friction between the end part and the opening inner wall which holds the two parts together.

#### THE SOLUTION:

- 5 According to the present invention the end part of the tube or mounting foot has a mainly flat recess for supporting and holding a mainly flat retainer. The retainer is made of a resilient material, and has a main plane, with at least one, from the main plane protruding barb type part or barb, engaging the inside wall of the opening in mounted position.
- 10 Preferably, the retainer is manufactured from hard sheet metal, and the protruding barb type part is made by a pressing or notching operation in a suitable, well known machine. In this way the retainer will be relatively cheap. The retaining function is improved if it has at least one protruding barb
- 15 extending from each side of the main plane, and if designed with first protruding barb parts to the one side of the main plane spaced from the edges of the retainer main plane and second protruding barb parts to the other side of the main plane at the edge of the retainer main plane, the relative movement between the foot and tube are minimised.

20

#### DESCRIPTION OF THE FIGURES:

The invention will in the following be described more in detail with reference to the attached drawings, in which:

- 25 Fig. 1 shows two roof rails of the concerned type, fitted to a vehicle roof, Fig. 2 shows a section through the assembled parts of one of the rails ends in fig 1,
- Fig. 3 shows a cross section through of the same parts as in Fig 2,
- Fig. 4 shows an isometric view of a retainer according to the invention,
- 30 Fig. 5 shows the retainer of Fig 4 from above,
- Fig. 6 is a side view of the retainer and
- Fig. 7 is an end view of the retainer.

# DETAILED DESCRIPTION:

In Fig. 1 a roof 1 of a motor vehicle, which could be any ordinary car, is shown. On the roof, at both sides, a rail 2 is arranged. Each rail comprises a tube 3 and two feet 4, arranged at opposite ends of the tube. The connection  
 5 between a foot 4a and a tube 3 is marked with an arrow 5 and is shown in detail in Figs. 2 and 3. The other connections between the feet and tubes are of the same type. The feet are, at their other ends, attached to the roof. This can be done in several known ways, and since it is no part of the invention it will not be described further.

10

In Fig 2 the connection between the foot 4a and the tube 3 is shown in section. It can be seen that the foot 4a has an end part, a nose section 6, which is inserted into an opening 7 of the tube 3. The nose section 6 further comprises a recess 8, into which is inserted a retainer 9, which is to be  
 15 further described in the following. The recess 8 and the retainer 9 are preferably dimensioned to achieve a light interference fit and for the retainer to be self retaining. Fig. 3 shows the same thing as Fig 2 but in cross section through.

20 In Figs. 4, 5, 6 and 7 the retainer 9 is shown in an isometric view, top view, side view and end view respectively. The material of the retainer is preferably sheet metal, but it could also be plastic or any other type of resilient material. The retainer 9 has a main plane 10 from which there are three barbs 11 protruding. The barbs 11 are stamped or notched from the main plane 10,  
 25 leaving openings 12. An appropriate angle between a barb 11 and the main plane 10 is 75 degrees, although the angle can be set within a large range to suit the application. For optimum performance it should be smaller than 90 degrees though.

30 At the edge of the retainer there are four notches 13, forming teeth 14, which are protruding to the other side of the plane like second barb parts, relative to the side with the barbs 11, the first barb parts. Two corners 15 are cut to

correspond with a similar outer form in the recess which ensures that the retainer can be fitted the correct way around only.

The mounting of the roof rail is made as follows. The retainer 9 is placed in  
5 the recess 8 of the foot 4. The retainer is placed with the barbs 11 pointing  
away from the recess surface and towards the main part of the foot 4. The  
notches 13 can be made in the way that the teeth 14 also protrude sideways,  
outside the edge line 16, almost in the main plane 10, (not shown) in order to  
engage with the walls of the recess for retaining the retainer. This self-  
10 retaining function is an advantage, especially if the recess is located on the  
underside of the nose section 6 when assembling. Then the nose section 6 is  
slid into the tube 3 opening 7. The assembly force needed is not large, since  
the retainer is oriented with the barbs 11 pointing in the sliding direction of  
the tube. The force needed is used to overcome the compressive force of the  
15 barbs which acts to force the barb edge to engage into the inner wall of the  
tube 3 and to force the teeth 14 on the underside to engage in the recess  
bottom. When the end surface 17 of the tube 3 reaches a corresponding end  
surface 18 of the foot 4, the connection is completed. The compressive force  
and the direction of the barbs 11 is now preventing the tube 3 and the foot 4  
20 from separating. The edges of the barbs 11 facing the inner wall of the tube 3  
are preferably sharp to ensure that they engage positively in the inner wall of  
the tube. The length and angle of the barbs decides what tolerances can be  
overcome, and the design of the retainer in this respect can be calculated  
and optimised from that. The thickness and hardness of the steel chosen is  
25 not critical but can be estimated by the person skilled in the art of sheet  
metal.

The invention is not limited to the embodiment shown in the drawings but can  
be varied in different ways within the scope of the claims. The recess 8 can  
30 be open towards the outer end of the protruding nose section 6 and the  
number of barbs and/or teeth can be varied to mention two modifications.  
The top end of the barbs can be curved inwardly or outwardly to ensure a

high pressure point of contact against the inner wall. Even if the word tube is used for the part connecting the two feet at opposite ends, it is understood that this part could be a solid bar with openings at the ends only, for receiving the nose section of the feet. Also the openings can be arranged in the feet and the nose section, containing the recess, could be on the tube.

5 The retainer could also be positioned simply on a flat surface on the nose section.



## CLAIMS

- 5 1. A roof rail (2) for a motor vehicle roof (1), the rail comprising a rail tube (3), at least one mounting foot (4) arranged at one end of the tube for connecting the tube to the roof, whereby one of the tube (3) and the mounting foot (4) has an end part (6) for insertion into a corresponding opening (7) in the other, and a retainer (9) arranged to cooperate with the end part and the inside wall  
10 of the opening, c h a r a c t e r i s e d i n that the end part (6) has a mainly flat recess (8) for supporting a mainly flat retainer (9), that the retainer is made of a resilient material and has a main plane (10), and that the retainer has at least one, from the main plane protruding barb part (11), engaging the inside wall in mounted position.
- 15 2. A roof rail according to claim 1, c h a r a c t e r i s e d i n that the retainer (9) is of sheet metal, manufactured of one piece.
- 20 3. A roof rail according to claim 2, c h a r a c t e r i s e d i n that the protruding barb part (11) is made out of the main plane (10) material by pressing or notching.
- 25 4. A roof rail according to any of the foregoing claims, c h a r a c t e r i s e d i n that the retainer (9) has at least one protruding barb part (11, 13,14) extending from each side of the main plane (10), engaging the inside wall and the recess (8) surface respectively in mounted position.
- 30 5. A roof rail according to any of the foregoing claims, c h a r a c t e r i s e d i n that the retainer (9) has first protruding barb parts (11) on the one side of the main plane (10) spaced from the edges (16) of the retainer and second protruding barb parts (13,14) to the other side of the main plane arranged at the edge (16) of the retainer.



Application No: GB 9826780.0  
Claims searched: 1-5

Examiner: Steven McIlroy  
Date of search: 22 February 1999

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): B7J J64  
F2M MB5

Int Cl (Ed.6): B60R 9/00, 9/04

Other: Online: EPOQUE: WPI, EDOC, PAJ

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2325202 A (JAC Products Inc.) See especially figures 3-5	-
A	GB 2304087 A (Happich) See whole document	-
A	GB 2302854 A (JAC Products Inc.) See whole document	-

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.